

AN EVALUATION OF NEW FIRE STATION LOCATIONS FOR SNOQUALMIE PASS FIRE & RESCUE



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October 2007

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BACKGROUND AND SIGNIFICANCE

Two separate fire districts, King County Fire District 49 and Kittitas County Fire District 5, initially served the Snoqualmie Pass area. On March 16, 1970, Kittitas County Fire District 5 was incorporated, and then King County Fire District 49 followed the next year, incorporating on March 16, 1971. Four months after the King County Fire District 49 incorporation an event occurred that validated the increasing need for emergency services. Two structures, a 28-unit multi-family condominium complex and a restaurant, caught fire and burned to the ground. Fortunately, the fire was contained to the two structures and did not spread to nearby Forest Service land and endanger additional buildings.

The two fire districts formally merged and became King County Fire District 51 (KCFD51) in 1992, which was renamed as Snoqualmie Pass Fire & Rescue (SPFR). In its inception, the Department consisted of a handful of volunteers with no emergency medical training and very little firefighting equipment. Over the last three decades the scope and mission of the Department has evolved to meet the growing needs of our community.

The Snoqualmie Pass area is a small, rural and recreational community nestled in the Cascade Mountain Range in Washington State along the Interstate 90 (I-90) corridor. The community has a year round population of approximately 400 which can increase to over 35,000 on weekends for skiing and other outdoor activities. Snoqualmie Pass is a destination recreational area with many lakes and rivers, hundreds of miles of hiking, biking, and equestrian trails, four separate downhill snow skiing areas including hundreds of miles of cross country and back country ski trails.

Snoqualmie Pass Fire & Rescue is a fire department staffed by volunteers with a group of 24 dedicated men and women. The Department protects the Denny and Gold Creek areas along with the Snoqualmie Pass Summit area, also responding to incidents on 15 miles of I-90 from mileposts 45 to 60. On busy travel days the Department of Transportation estimates that 60,000 vehicles drive through Snoqualmie Pass. Interstate 90 ties as the most heavily traveled mountain pass in the United States and is a critical highway for commuters and commerce traveling through Washington and beyond. SPFR is on a pace to respond to approximately 382 incidents this year. Historically, approximately 84 percent of these calls will be for non-residents. Financially, area taxpayers are funding a Department that, for a majority of the time, is responding and servicing non-residents. SPFR does not currently receive any funding for the mitigation of I-90 or for responses to the local recreational areas, which account for 46 and 26 percent of annual call volumes respectively. Nearly all of these emergency incidents will be for people traveling to or through the area and are not contributing financially for those services.

Snoqualmie Pass Fire and Rescue was formed for the purpose of fire prevention services, fire suppression services, emergency medical services, and for the protection of life and property pursuant to Chapter 52, Revised Codes of Washington. SPFR's mission statement reads:

“The mission of Snoqualmie Pass Fire & Rescue is to provide quality, cost effective, emergency services for the preservation of life and property. This service shall be compatible with the needs of the community and at levels reasonably permitted by publicly approved funding.”

SPFR takes these goals seriously and as such all of the Department functions are designed with the mission statement in mind..

One of the most important aspects of providing emergency services pertains to the time it takes to get to the emergency scene otherwise known as response time. Response times can be further separated into two different categories, turnout time and response time. Turnout time, also referred to as reaction time, is the time it takes for the unit to start responding after being dispatched. Response time is the time it takes to get to the scene once a unit has started responding.

While SPFR is not staffed with career firefighters yet, we need to consider the standards established for both career and volunteer staffed fire departments. Career fire departments in our use the recommendation of the National Fire Protection Association (NFPA) Standard 1710 as a target goal for staffing and responses. The standard affects nearly all aspects of operations within a fire department, but in regards to response times it specifically states that a first arriving engine should do so with a turnout time of one minute and response time of less than four minutes for a total response time of less than five minutes. The remainder of a first alarm assignment should also arrive within a total of nine minutes. The standard also states that this time objective should be reached at least 90 percent of the time (NFPA 1710, 2004, p. 24-25).

The NFPA has also drafted a similar standard for fire departments that are primarily staffed with volunteers, NFPA 1720. In this standard the recommendation is that responses should be adjusted for different demographics. The demographic criteria reflect population density and in that regard SPFR falls under the rural classification of less than 500 people per square mile. In that classification the minimum overall response

time is six personnel arriving on scene in less than 14 minutes. This benchmark should be reached 80 percent of the time. (NFPA 1720, 2004, p. 16).

One thing that is certain when considering the future at SPFR is that the Department is at a hypothetical crossroads. Growth in call volume, growth of the community, and growing responsibilities as a provider of emergency services are all indicators that SPFR needs to make changes to their short and long-term planning and that career staffing in some manner will be necessary. The overriding principle that must be addressed when considering the different locations of our new fire station is what will be the best location to provide the emergency services for our community.

National Fire Protection Association (NFPA) standards are a good starting point for obtaining definitive benchmarks for firefighting operations. While NFPA standards are recommendations only, they are generally adopted unilaterally within the industry. NFPA 1710 specifically addresses career fire department emergency responses in chapter four:

“4.1.2.1 The fire department shall establish the following time objectives:

- (1) One minute (60 seconds) for turnout time
- (2)* Four minutes (240 seconds) or less for the arrival of the first arriving engine company at a fire suppression incident and/or 8 minutes (480 seconds) or less for the deployment of a full first alarm assignment at a fire suppression incident
- (3) Four minutes (240 seconds) or less for the arrival of a unit with first responder or higher level capability at an emergency medical incident
- (4) Eight minutes (480 seconds) or less for the arrival of an advanced life support unit at an emergency medical incident, where this service is provided by the fire department.

4.1.2.2 The fire department shall establish a performance objective of not less than 90 percent for the achievement of each response time objective specified in 4.1.2.1.” (NFPA 1710, 2004, p. 24)

Not only does this chapter specify an appropriate response time, but it also states what percentage of the time, 90 percent, this objective should be met. While chapter four addresses response times, it applies to fire departments staffed with career firefighters, not volunteer staffed fire departments. SPFR is currently staffed with volunteers so NFPA 1720, which pertains to volunteer fire departments, must also be considered. In chapter four of NFPA 1720:

“4.3.2* Table 4.3.2 shall be used by the AHJ to determine staffing and response time capabilities, and the fractal accomplishment of that for reporting purposes as required in 4.

Table 4.3.2 Staffing and Response Time

Demand Zone	Demographics	Staffing and Response Time	Percentage
Special risks	AHJ	AHJ	90
Urban	1000 people/1 sq. mi.	15/9	90
Suburban	500-1000 people/1 sq. mi.	10/10	80
Rural	< 500 people/1 sq. mi.	6/14	80
Remote*	≥ Travel Dist 8 miles	4	90

*Upon assembling the necessary resources at the emergency scene, the fire department should have the capability to safely initiate an initial attack within 2 minutes 90 percent of the time.” (NFPA 1720, 2004, p. 16)

Table 1

Within this standard, SPFR would fall under the “Rural” demand zone and therefore would need six personnel on scene within 14 minutes, 80 percent of the time.

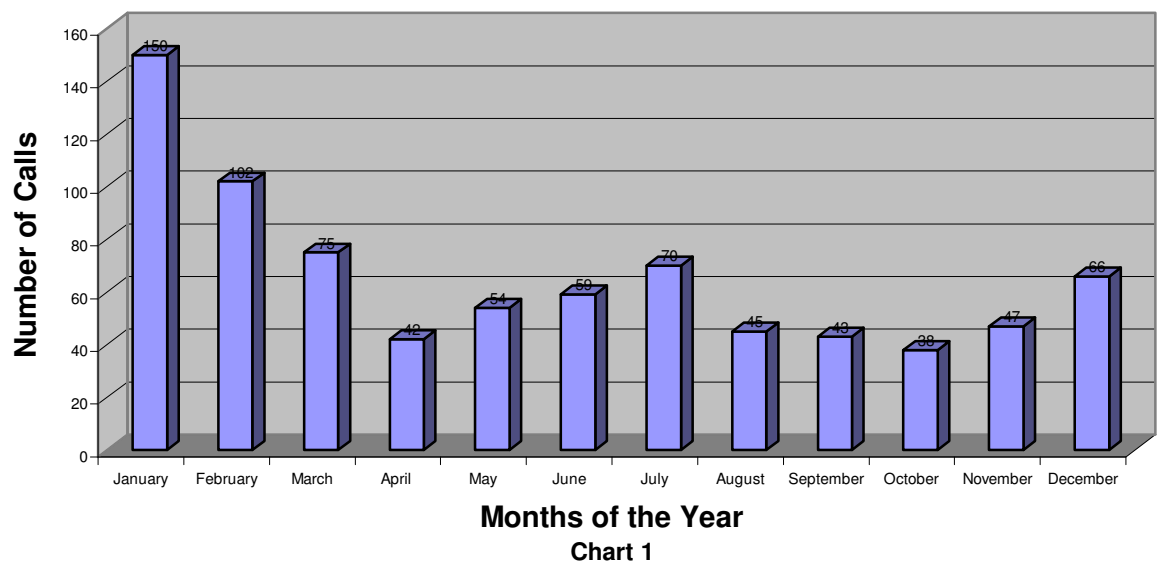
Considering which demand zone to use is a significant factor because Snoqualmie Pass does not fit the regular demographics of a fire department staffed by volunteers. The year round population of the area is approximately 400 which would indicate that the

Department serves a rural community. Unfortunately that is only part of the equation. On busy weekends, with the population soaring to over 35,000, the population load is equivalent to that of a suburban or even an urban area. In “A Needs Assessment of the U.S. Fire Service” document written by the United States Fire Administration (USFA) and NFPA:

“Community size is related to the US fire service not only in terms of the relative emphasis on career vs. volunteer firefighters but also in terms of the challenges faced by local departments. However, it is possible to exaggerate those differences. Even a rural community can have a large factory complex, a large stadium, or even a high-rise building, with all the technical complexities and potential for high concentration of people or valued property that such a property entails.” (Assessment, 2004, p. 5)

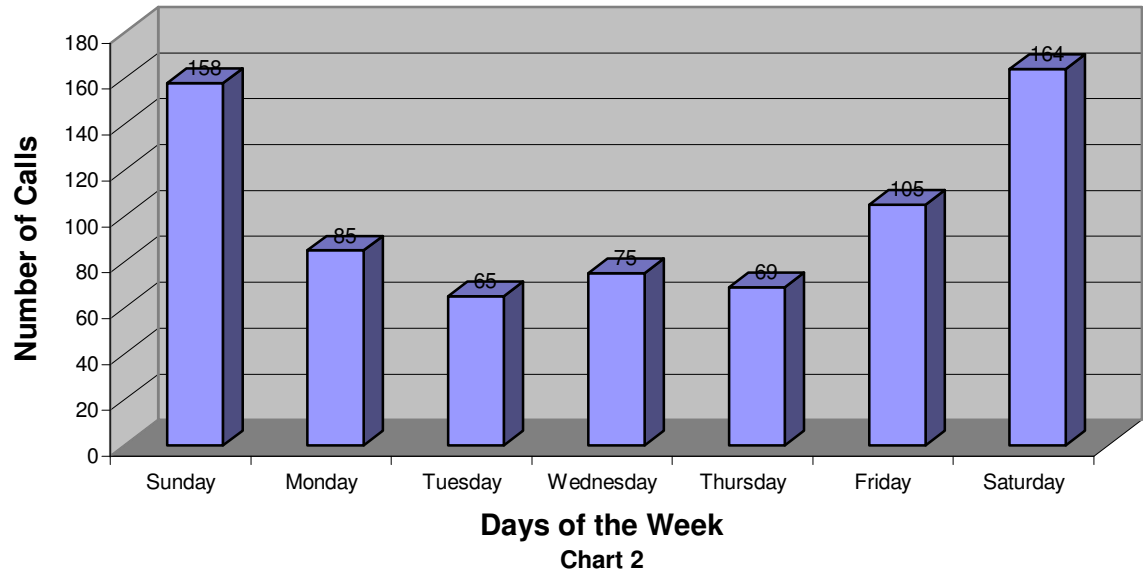
This directly relates to the heart of the problem in Snoqualmie Pass where there are periods of time with extreme population swings and emergency services needs. Another indicator of how emergency incidents can increase is to look at the percentage of calls throughout the year. The graph on the following page shows the elevated volumes during the recreational periods of the year, specifically the high volumes in the summer and even higher volumes in the winter during ski season.

Incidents on Each Month of the Year Historically Since 2002



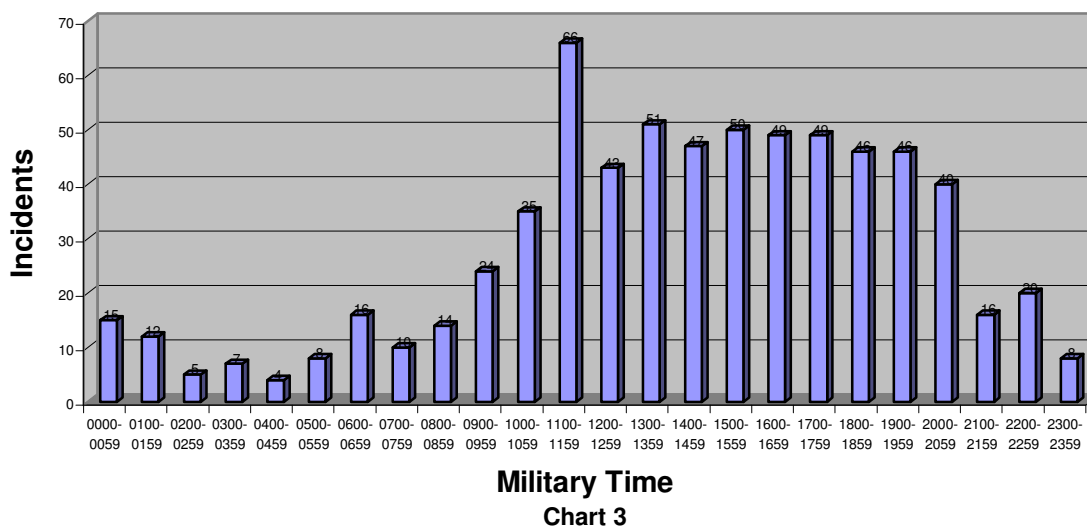
This is further illustrated by looking at the different days of the week.

Incidents on Days of the Week Historically Since 2002



And the call volumes throughout the hours of the day are shown in the graph below.

Hourly Breakdown for Incidents Historically Since 2002

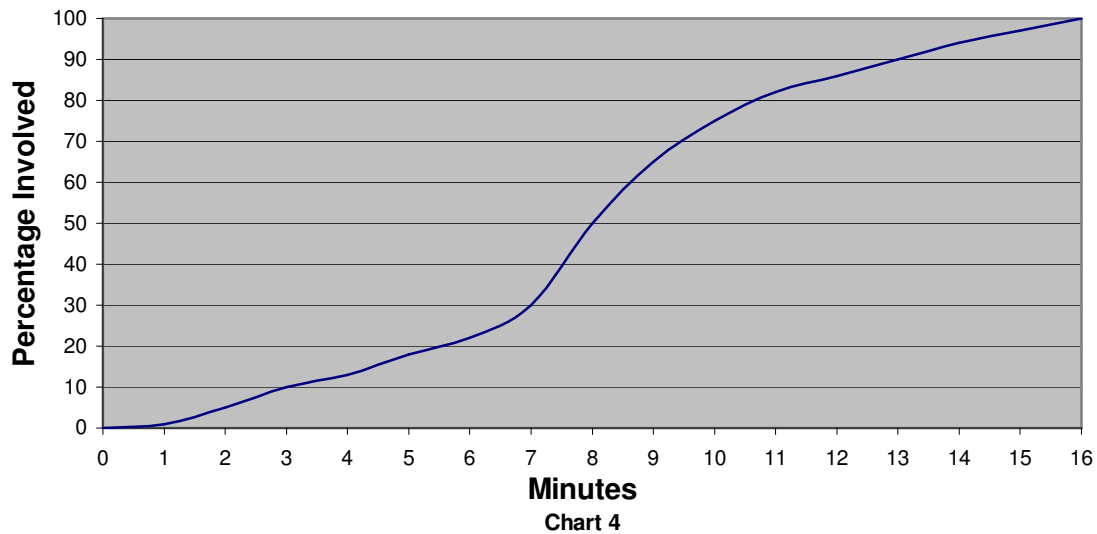


All of which points toward the high density of call volumes during the peak periods of population in the Snoqualmie Pass area. This can create a problem because not only do volunteers driving to the station to respond on the call have to fight through traffic and congestion, but also once they are in the fire apparatus they are faced again with the same congestion.

The risk that citizens absorb by not having a rapid and sufficient response is stated in NFPA 1710 and represented by the graph below.

“The ability of adequate fire suppression forces to greatly influence the outcome of a structural fire is undeniable and predictable. Data generated by NFPA provides empirical data that rapid and aggressive interior attack can substantially reduce the human and property losses associated with structural fires.” (NFPA 1710, 2004, p. 30)

Fire Propagation Curve



The graph shows how fire propagation occurs in a residential structure with flashover occurring at 10 minutes and the fire extending from the room of origin into bordering rooms. What makes the time it takes for extension into the next room significant is comparing that statistic to civilian deaths, injuries and dollar loss per fire as shown in the table below from NFPA 1710.

Fire Extension in Residential Structures 1994–1998

Rate Per 1,000 Fires

Extension	Civilian Deaths	Civilian Injuries	Dollar Loss per Fire
Confined to the room of origin	2.32	35.19	3,185
Beyond the room but confined to the floor of origin	19.68	96.86	22,720
Beyond the floor of origin	26.54	63.48	31,912

Table 2

What this shows is that civilian deaths increase by 748 percent, injuries by 175 percent, and dollar loss by 613 percent on the average when the fire is not contained to the fire origin and as show previously that will probably not occur if the fire burns for more than 10 minutes (NFPA 1710, 2004, p. 30). What does this indicate? Problems for volunteer fire departments including SPFR, where the District either does not have enough personnel to initiate an interior attack or whose response time is too slow to contain a fire to the room of origin.

Response times for Snoqualmie Pass Fire & Rescue (SPFR) average nearly 13 minutes, when NFPA 1710 dictates a response time of five minutes 90 percent of the time for a career engine and NFPA 1720 states a 14 minute response time 80 percent of the time for volunteers. SPFR embraces attributes of both a career and volunteer staffed fire department and the data indicates that the Department is failing to meet the criteria and that change is needed.

NEW STATION LOCATIONS

During the last ten years different locations for a new fire station have been considered, evaluated and ultimately found to not be viable. The reasons for such have been varied, such as non-centrally located or not large enough plots, but predominantly the reason has been no available funding. That is why SPFR has been very excited to work with the Forest Service, State Representatives, and Senators to try and find a solution to our dilemma. For the purpose of this report past potential locations that have been previously dismissed will not be evaluated, but rather the current three proposed locations will be focused upon. Those locations are generally known as the existing station 291, the exit 53 parking lot, and the Hyak parking lot. The different locations will be evaluated on construction issues, construction costs, response times, environmental aspects and property acquisition. These criteria will not be expanded upon at great length, but will require statements and a determination on feasibility.

Before getting to the details of each site an overall map of Snoqualmie Pass with corresponding response times to different points is needed. On the following pages are maps and tables, which will be referred to in the discussion of the different proposed station sites.

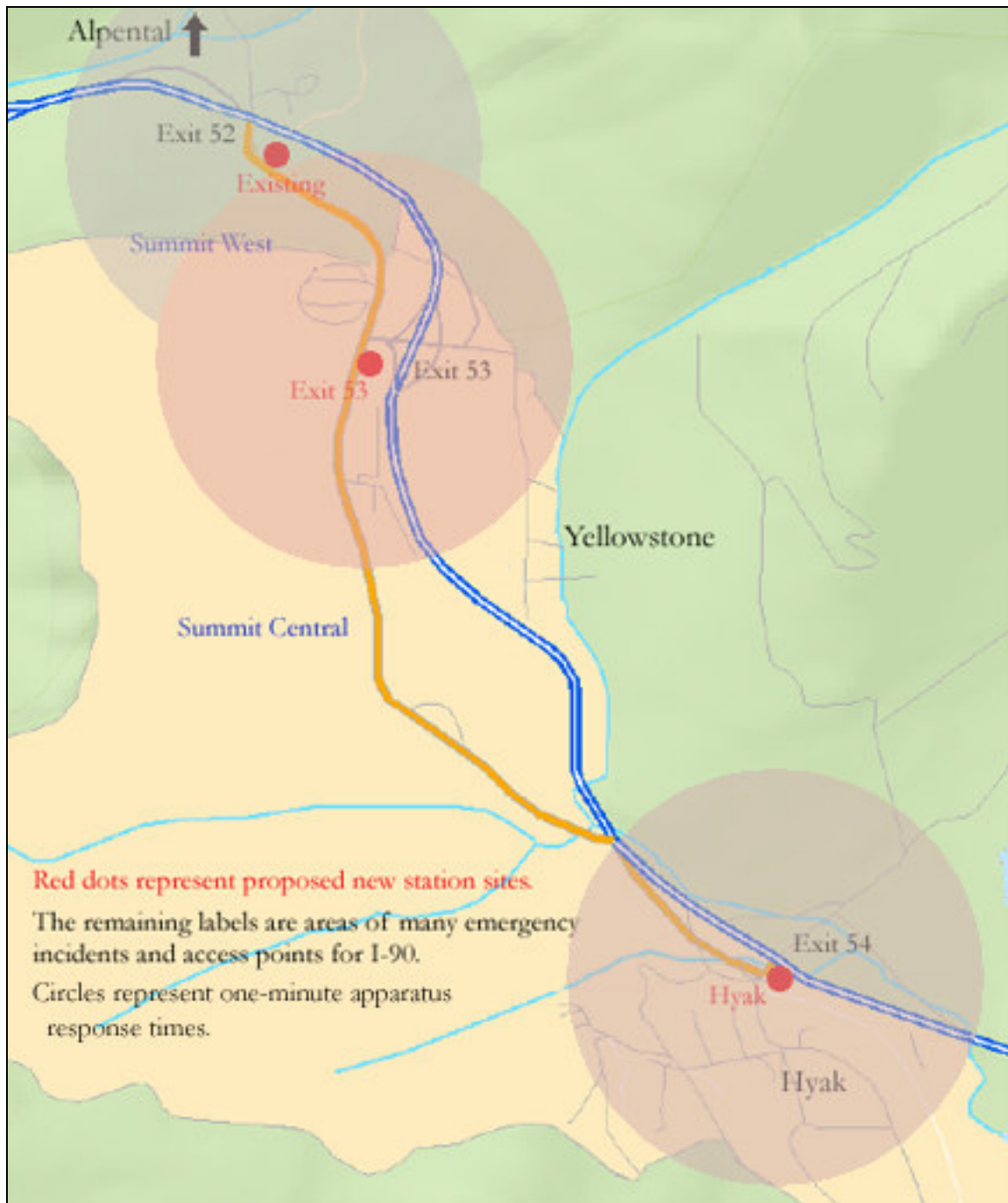


Chart 5

The map graphically illustrates the general locations of the proposed fire station sites, residential areas, access points, common response locations, and a one-minute response circle. Note that the Alpentel residential area is not drawn on the map due to problems

with scale. The following table lists different response and travel times within the District.

Response Times for Volunteers From Residential Areas to Station Sites					
	To Existing Sta 291	To Exit 53 Parking Lot	To Hyak Parking Lot		
Hyak Condos	5 min, 49 sec	4 min, 37 sec	1 min, 1 sec		
Yellowstone	3 min, 0 sec	2 min, 26 sec	5 min, 59 sec		
Alpental Condos	3 min, 31 sec	4 min, 43 sec	8 min, 19 sec		
Response Times for Apparatus to Access Points and Common Response Locations					
	To Exit 52	To Exit 53	To Exit 54	To Summit West	To Summit Central
Existing Sta 291	27 sec	1 min, 12 sec	4 min, 55 sec	6 sec	2 min, 37 sec
Exit 53 Parking Lot	1 min, 39 sec	27 sec	3 min, 43 sec	1 min, 3 sec	1 min, 28 sec
Hyak Parking Lot	5 min, 15 sec	4 min, 3 sec	29 sec	4 min, 39 sec	2 min, 8 sec
All times are averages at posted speed limits. Apparatus response times would potentially be slightly faster due to the possibility of exceeding the speed limit by 10 mph per District policy.					

Table 3

The upper portion of the table refers to the time it takes for volunteers to drive from three different residential areas to the three proposed station sites. The lower portion lists the response times for apparatus to respond from the station sites to access points and common emergency location sites.

Finally, the general location of emergency incidents is also needed. The map on the following page illustrates the location of incidents for SPFR. It is difficult to interpret the map, but it does give a visual representation of where emergency incidents occurred in 2005 and 2006. For example, 45 percent of all emergency incidents occur on I-90 and 26 percent at the ski areas, predominantly Summit Central and Summit West.

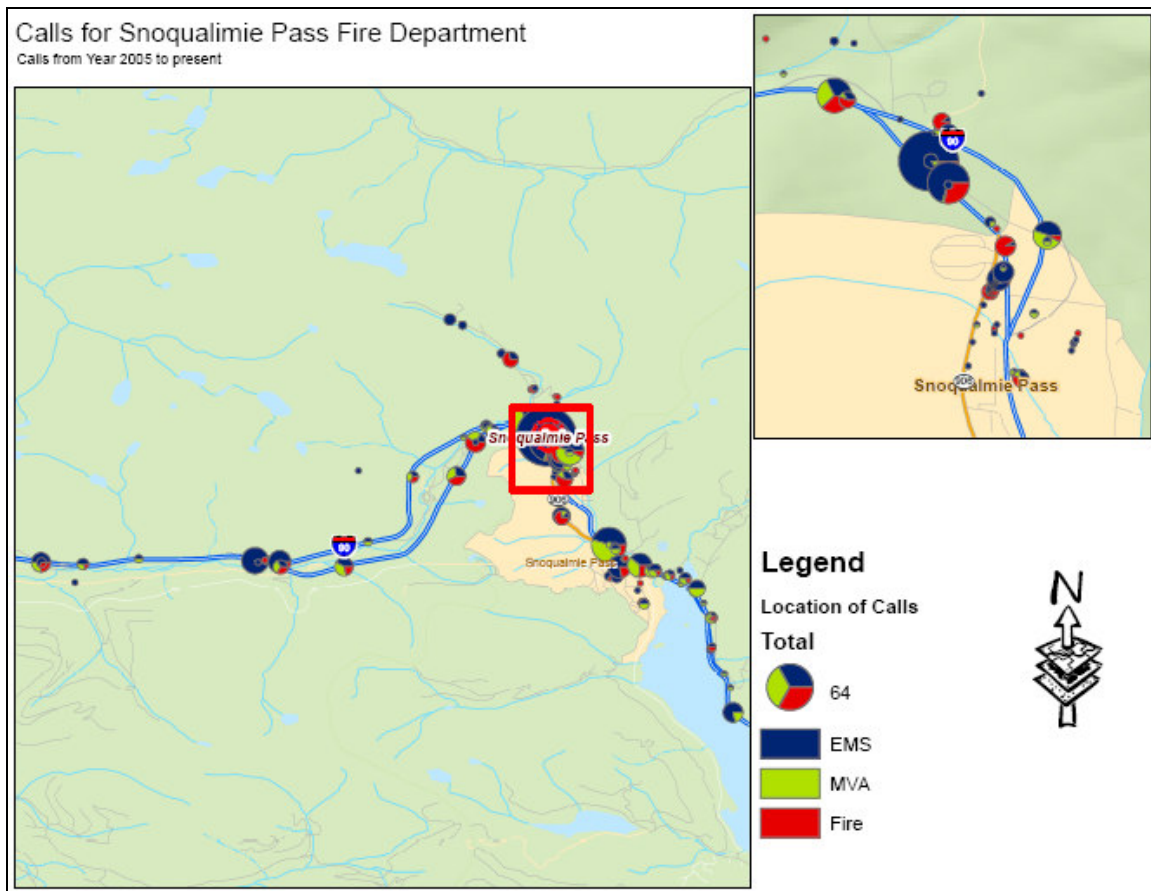


Chart 6

PROPOSED SITE DISCUSSION

Existing Station 291



Construction: This location has been the site for SPFR operations since the inception of the fire department in Snoqualmie Pass. However, constructing a new station on the existing site would be difficult for two reasons, interim emergency operations and site elevation. To build a new station on this site the current station would need to be removed. This would require an interim location for fire department operations during construction of probably a year and a half. The build site would also need to be lowered by approximately 15 to 20 feet for better access to SR906. This would also eliminate the possibility of having drive through apparatus bays.

Costs: The construction issues would significantly increase the cost of the overall project an estimated \$500 thousand to \$1 million. However, there are potential advantages of this site. If removing the drive through bays was acceptable, then a two-story building could be constructed with disability access from the rear without requiring an elevator.

Response Times: The response times to the fire station from Alpental and Yellowstone residential areas are good, but from Hyak it is more remote. Responding apparatus have great access to westbound I-90 at exit 52 and good access to eastbound I-90 from exit 53. The station is located for good access to Summit West and Alpental, and decent access to Summit Central. The station is situated at the top of Snoqualmie Pass so responses are fairly centrally located and are not inhibited by responding uphill.

Environmental Aspects: The location of the existing station is surrounded on three sides by I-90 and SR906 with trees, etc. on the parcel outside the footprint of the station and parking lot. There are areas of wetlands, but generally the lot does not appear to be a habitat for a significant amount of wildlife (see Watershed Company Report for full details). There are some Snoqualmie Pass Utility District wells on the west side of the parcel and the impact of construction would need to be investigated.

Property Acquisition: The U.S. Forest Service currently owns this property and has expressed an interest in selling the property. The market value of this property has not been determined, however, this property is zoned for Commercial use. Consequently, it is a highly desirable piece of property for development.

Exit 53 Parking Lot



Construction: Constructing a new station on this site would be relatively straightforward. The lot is level and at the same elevation as SR906 making easy access. The footprint of the station and parking lot is anticipated to be entirely or predominantly on the existing parking lot eliminating much site preparation.

Costs: There are no additional costs in construction on this site.

Response Times: The response times to the fire station from Alpental and Yellowstone residential areas are good. Responses from Hyak are better, but still lengthy. This location is the most centrally located site for response times from the different residential areas. Responding apparatus have great access to west and eastbound I-90 from exit 53. The station is located for good access to Summit West and Summit Central with slightly longer access to Alpental. The station is situated at the top of Snoqualmie Pass so responses are fairly centrally located and are not inhibited by responding uphill.

Environmental Aspects: This location is similar to the existing station 291 in that it is surrounded on three sides by I-90 and SR906 with trees, etc. on the parcel outside the footprint of the station and parking lot. There are some areas of wetlands to the north and

south of the proposed build site that would need to be identified and buffered, but generally the lot does not appear to be a habitat for a significant amount of existing wildlife (see Watershed Company Report for full details).

Property Acquisition: The U.S. Forest Service currently owns this property and has expressed an interest in selling the property. The market value of this property has not been determined, however, this property is zoned Forest and Range, which has limited uses associated with it but does allow the construction of a Fire Station. However, given its restrictive zoning it has minimal commercial value and getting a variance in Kittitas County is very difficult. This property is less desirable for development.

Hyak Parking Lot



Construction: Constructing a new station on this site would be slightly difficult. The lot is level and at the same elevation as Hyak Drive East. However, the footprint of the station would not easily fit onto the parcel. The new station will be longer than it is wide, but it also requires area in front and behind the apparatus bays for access. It is not entirely clear where the parcel lot lines are for this site, but the lot does not appear to be

deep enough to allow the station to sit facing SR906. This would require the station to face Hyak Drive East, but the site is also not deep enough in this direction for access to the station requiring the removal of drive through apparatus bays. Facing Hyak Drive East is not a desirable direction of travel for responding apparatus due to the intersection of Snoqualmie Drive and that most responses would require apparatus to turn onto Hyak Drive East and then onto SR906.

Costs: There are no additional costs in construction on this site.

Response Times: This location is a remote site for responding volunteers and apparatus. The response times to the fire station from Alpentel and Yellowstone residential areas are very poor, but responses from Hyak would be great. There is great access to west and eastbound I-90 from exit 54. The station is located for decent access to Summit Central, but poor access to Summit West and Alpentel. Furthermore, the station is situated at the east end of Snoqualmie Pass and at a lower elevation so responses to most emergencies would be lengthy and uphill.

Environmental Aspects: This location is similar to the other sites in that it is a parking lot bordered on three sides by roads. The parcel has single-family residences and natural growth including wetlands to the east. In general the lot does not appear to be a habitat for a significant amount of existing wildlife (see Watershed Company Report for full details).

Property Acquisition: A real estate developer currently owns this property and has not been approached as to whether or not they would be interested in selling this property. However, this property is zoned as Planned Unit Development Zone, which allows a wide variety of uses such as all residential uses, including multifamily structures;

manufactured homes parks; hotels, motels, condominiums; retail businesses; commercial/recreation businesses; restaurants, cafes, taverns, and cocktail bars. While this zoning does allow for a wide variety of uses, it does not allow for the construction of a Fire Station without getting a variance, which is very difficult in Kittitas County. Given the wide variety of uses that current zoning allows it is expected that this property would be a highly desirable piece of property for development.

Summary of Proposed Sites

As with the discussion of the different sites the following is a ranking and evaluation of the proposed sites with the same criteria.

Construction: The exit 53 parking lot site would be the easiest to build upon and would not necessitate changing the usage and goals of the new station.

Costs: Due to the increased costs of construction and the purchase of land, the exit 53 parking lot site would be the most fiscally responsible. The savings would be very substantial.

Response Times: The exit 53 parking lot site is most centrally located and has the best access for response times to and from for volunteers and apparatus respectively.

Environmental Aspects: Due to a structure already sitting on the site, the existing station 291 would have the least impact on the environment, but all three do not appear to have significant existing wildlife.

Property Acquisition: Both the existing site and the exit 53 parking lot could both potentially be acquired through a land conveyance. However, if market value were

required for purchasing then the existing station site would be significantly more expensive. This makes the exit 53 parking lot slightly more desirable.

The table below visually identifies how each of the proposed sites rates with the four criterion used to evaluate viability.

Evaluation Summary of Proposed Sites		Poor	Average	Good	Excellent
Existing Station 291	Construction	X			
	Costs	X			
	Response Times			X	
	Environmental		X		
	Property Acquisition		X		
Exit 53 Parking Lot	Construction				X
	Costs			X	
	Response Times				X
	Environmental		X		
	Property Acquisition			X	
Hyak Parking Lot	Construction	X			
	Costs			X	
	Response Times	X			
	Environmental		X		
	Property Acquisition	X			

Table 4

CONCLUSION

There are many issues surrounding the three proposed sites. Some are an advantage, but many are disadvantages for different reasons. The Department needs to evaluate the many factors that pertain to locating the new fire station and come up with a solution. The reason and mission of the fire department is to respond to emergencies for our community and those who travel to or through Snoqualmie Pass. This requires a fast, efficient emergency response and as such is probably one of the most important aspects of station location. Evaluating this and the other factors has led to an obvious conclusion.

The best site for the new fire station is the exit 53 parking lot. There are some recognized environmental concerns with this location, but hopefully SPFR can address these problems and move forward with the project.

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